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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 39671	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/FI 2003/000627	International filing date (day/month/year) 27.08.2003	Priority date (day/month/year) 28.08.2002
International Patent Classification (IPC) or national classification and IPC D21F1/00, D21F7/00		EPO - DG 1 10.12.2004
Applicant Metso Paper Inc. et al. (52)		

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☒ (sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

- This report contains indications relating to the following items:

<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input type="checkbox"/> Box No. II	Priority
<input type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI	Certain documents cited
<input type="checkbox"/> Box No. VII	Certain defects in the international application
<input type="checkbox"/> Box No. VIII	Certain observations on the international application

Date of submission of the demand 27.02.2004	Date of completion of this report 02.11.2004
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Form PCT/IPEA/409 (cover sheet) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2003/000627

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages _____ as originally filed/furnished
- pages* 1-3 received by this Authority on 02.07.2004
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 4-5 received by this Authority on 02.07.2004
- pages* _____ received by this Authority on _____
- ☒ the drawings:
- pages 1 as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to the sequence listing (specify): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (specify): _____
- ☐ any table(s) related to the sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2003/000627

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-9</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-9</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-9</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The following document is cited in the International Search Report:

D1: WO 9955958 A1

The cited document represents the general state of the art. The invention defined in claims 1-9 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method for controlling the temperature of a web.

Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-9 is novel and is considered to involve an inventive step. The invention is industrially applicable.

Method for controlling the temperature of a cellulosic web entering a dryer

The present invention relates to a method for controlling the temperature of a web, which is formed from cellulosic pulp and is to be passed to a dryer, by way of applying temperature-controlled liquid to the web when passed into a closed space, where-
5 in said temperature-controlled liquid is applied at controlled pressure and flow rate to the web.

Conventionally, a traveling cellulosic web has been heated by flooding the web with
10 a liquid, whereby uncontrollable penetration of the liquid into the web occurs. As this overflow-flooding step of heating takes place in an open space, it is hampered by problems from the overflow of the liquid and release of expansion steams.

It is an object of the present invention to overcome the above-mentioned problems by
15 virtue of a method characterized in that said closed space is defined by two wires and side deckles, and that said liquid is applied through the wires into the web both from below the bottom wire and from above the top wire.

Generally, the closed spaced remaining between the wires is maintained at a moder-
20 ate positive pressure. The method according to the invention is capable of controllably setting the web temperature at a desired level, e.g., close to 100 °C, thus improving water removal from the web in the press section next downstream of the closed space, whereby the web is maximally hot and has a high solids content at the instant the web enters the dryer section. Furthermore, the method according to the invention
25 may be applied generally in the temperature control of a web, even for cooling, thus making it possible to set the web temperature optimally for drying a cellulosic web. The method also facilitates addition of chemicals into the web in order to improve the qualities of the web.

30 According to the invention, the liquid can be applied via boxes to the web, both from the underside of the lower wire and from the top side of the upper wire either simultaneously or alternatingly. The penetration of the liquid being applied into the web

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may be improved if so desired by way of maintaining a pressure difference between the liquid application point and the side of the web opposite to the application point. This arrangement can be accomplished using, e.g., suction boxes that are located on the opposite side of the web relative to the liquid application point, substantially
5 aligned with said point.

There may be located a plurality of liquid feed points above and below the web, preferably in alternating positions.

10 As the web enters the closed space between the wires, its solids content is in a range of about 0.5 % to about 4.0 %, while the solids content is in a range of about 20 % to about 30 % when the web exits the closed space and enters the press section.

15 In the following, the invention will be described in greater detail by making reference to the appended drawing showing a schematic side elevation view of an apparatus layout suitable for implementing the method according to the invention.

The method employs a twin-wire machine having a bottom wire 1 and top wire 2. Cellulosic pulp is fed into the headbox 3 of the twin-wire machine, wherefrom the
20 pulp flows as a uniform sheet into a closed space 4 defined by the bottom wire 1 and the top wire 2 in cooperation with side deckles (not shown), wherein a web 5 is formed. When entering this closed space 4, the solids content of the web is typically in a range of about 0.5 % to about 4.0 %. This closed space 4 is generally maintained at a moderate positive pressure.

25 In order to control the temperature of the web 5 to a desired level, below the bottom wire 1 and/or above the top wire 2 are placed liquid feed points 6, 7, 10 wherefrom to the web 5 is applied a liquid advantageously via a box at a controlled temperature, pressure and flow rate. As shown in the drawing, the liquid is applied to the web 5
30 first from below the bottom wire 1 at liquid feed points 6 and 10, whereupon liquid application takes place from above the top wire 2 at liquid feed points 7. Obviously, the apparatus may incorporate more liquid feed points either above or below the web

or in alternating positions both above and below the web.

When necessary, the penetration of the liquid being applied into the web 5 can be improved by means of suction boxes 8, 9 adapted to operate opposite to some or each
5 one of the liquid feed points 6, 7, 10, substantially aligned with the opposed liquid feed point.

According to an embodiment of the invention, the web is heated in the method of the invention to a temperature close to 100 °, whereby the removal of water from the
10 web 5 is enhanced in the press section located downstream of the twin-wire region. Resultingly, the temperature and solids content of the web are elevated maximally high as the web enters the dryer section, whereby drying of the web is speeded up and energy consumption of the dryer is lowered.

15 Alternatively, the method may also be employed for cooling the web 5 in order to set the temperature of the web 5 to an optimal level for drying a cellulosic web.

Furthermore, the method according to the invention facilitates the addition of web quality improving chemicals into the web in conjunction with the liquid being
20 applied to the web, thus allowing the control of, e.g., the pH of the web.

When exiting the closed space 4 defined by the wires 1, 2, the solids content of the web has increased reaching from about 20 % to about 30 %.

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Claims:

1. A method for controlling the temperature of a web (5), which is formed from
cellulosic pulp and is to be passed to a dryer, by way of applying temperature-
5 controlled liquid to the web when passed into a closed space (4), wherein said
temperature-controlled liquid (6, 7, 10) is applied at controlled pressure and flow rate
to the web (5), **characterized** in that said closed space (4) is defined by two wires (1,
2) and side deckles, and that said liquid is applied through the wires (1, 2) into the
web both from below the bottom wire (1) and from above the top wire (2).
10
2. Method according to claim 1, **characterized** in that in the closed space (4)
between the wires (1, 2) a moderate positive pressure is maintained.
3. Method according to claim 2, **characterized** in that the penetration of the liquid
15 being applied into the web (5) is improved by maintaining a pressure difference
between the opposite sides of the web.
4. Method according to any of the previous claims, **characterized** in that the
temperature of the web (5) is elevated substantially close to 100 °C.
20
5. Method according to claim 3 or 4, **characterized** in that, in order to establish said
pressure difference, a suction box (8, 9) is adapted to operate opposite to some or to
each liquid feed point (6, 7, 10) on the other side of the web, substantially aligned
with said liquid feed point (6, 7, 10).
25
6. Method according to any of the preceding claims, **characterized** in that chemicals
are added to the web (5) in conjunction with the liquid application in order to
improve the qualities of the web.
- 30 7. Method according to claim 6, **characterized** in that the liquid is applied to the
web at several successive points (6, 10; 7).

5

8. Method according to claim 7, characterized in that the liquid is applied alternately from above and from below the web.

9. Method according to any of the preceding claims, characterized in that the solids
5 content of the ingoing web (5) is about 0.5 - 4.0 % and the solids of the outgoing web
prior to its entry into the dryer is about 20 - 30 %.

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